

REMARKS

Claims 9-13, 18-22 and 53-57 were examined in the Office Action dated March 25, 2003. All claims were rejected. In this paper, applicants have amended claims 9, 53, 56 and 57. Claims 9-13, 18-22 and 53-57 remain pending.

Claim 9 has been amended so that the prior provision that the article exhibits an optical interference effect now corresponds exactly to the language earlier in the claim regarding a “diffraction grating pattern or a holographic image pattern.” Similarly, claims 53 and 57 have been amended to relate back to the exact language appearing earlier in the claim. In addition, claim 53 has been amended to state that the claimed color shifting optical coating is on the second surface of the substrate. Claim 56 has been amended to remove the portion of the claim that is duplicative to amended claim 53.

All of the presently pending claims now recite combinations including the formation of a diffraction or holographic image pattern or an optical interference pattern on the “top” of a light transmissive substrate, and the formation of a multilayer optical coating including an absorber layer, a dielectric layer and a reflector layer on the “bottom” of the substrate. All of the pending claims were rejected as being obvious over Uyama Patent No. 5,700,550 in view of Coombs-5,214,530. Applicants respectfully traverse this rejection in view of the current amendments and in view of the following remarks.

Uyama contains little disclosure to render a review of his structure simple. Nevertheless, a careful analysis of Uyama leads one to understand that Uyama forms a holographic pattern on the “bottom” of his layer 4, and then forms a high / low index stack directly contiguous with the holographic pattern, commencing with a high index layer immediately adjacent the hologram. This understanding is reached by noting that Uyama has

disclosed the use of a base member 2 having certain characteristics such as flexibility, tensile strength and flatness (see column 5, lines 19-32), followed by the formation of a separate layer 4 onto the base member. Both layers 2 and 4 have similar indices of refraction.

Without some form of reflection associated with the hologram, it is not possible for the human eye to see the hologram, at least well enough to serve as a security feature. Those of ordinary skill prior to the present invention would recognize that depositing an index-matched material onto the hologram would render it non-visible, whereas depositing a reflector onto the hologram would make it visible. Hence, the Uyama hologram cannot be located on the “top” of layer 4.

By placing the hologram structure on the “bottom” of layer 4, and then coating it with a high index material such as zinc sulfide, Uyama teaches that the hologram is visible. This is because the high index layer of zinc sulfide imparts some reflectivity at the hologram/zinc sulfide boundary. It is because of the need to obtain this reflectivity that Uyama writes at column 6, lines 21-24 that it is important that the layer below the hologram forming layer be a high-refractive index layer.

~~In view of the foregoing, Applicants have concluded that Uyama teaches ONLY the~~
formation of a hologram structure on the “bottom” of layer 4. And, Uyama certainly does not teach or suggest the formation of the hologram structure on the “top” of layer 4.

Uyama further teaches that the use of a high / low index stack overlying the hologram, with the immediately adjacent layer being of a high index material, allows one to observe some color shifting effect in addition to the hologram. However, this teaching does not render it possible for one to simply substitute other types of multilayer stacks for Uyama's

high/low index stack. The optical characteristics of many multilayer stacks are quite complex, and even though they may work one way when standing alone, interactions may occur when they are combined that render them inoperative with one another.

It is for this reason that Coombs may not be combined with Uyama in the manner the Examiner has suggested. Coombs is not directed to a combination of his multilayer stack with other optical structures. Rather, Coombs teaches the formation of a multilayer stack including absorber, dielectric and reflector layers in a stand-alone structure. Nothing in Coombs would teach or suggest to one of ordinary skill that the Coombs structure could be combined with a hologram to provide a device in which the hologram and his multilayer stack would both retain the optical characteristics they exhibit separately. Nothing in Coombs teaches or suggests that the hologram structure should be formed on the “top” of a light transmissive substrate, and that a multilayer stack comprising an absorber layer, a dielectric layer, and finally a reflector layer should be formed on the “bottom” of the substrate. Nothing in Coombs suggests that placing his stack directly contiguous with a hologram on the “bottom” of a transmissive layer, that the hologram would be visible to a human eye and his optical stack would continue to exhibit color shifting effects. And, nothing in Coombs would teach or suggest that you could place his stack on the opposite side of a substrate from which a hologram structure is located. In short, nothing in Coombs adds anything to Uyama, and contains nothing beyond the teaching that a multilayer stack including absorber/dielectric/reflector layers will have color shifting properties when standing alone. Stated another way, Coombs does not teach or suggest that his structure should be combined with a hologram, nor motivate one of ordinary skill to make such a combination, nor to do so in accordance with the claim limitations found in the pending claims.

Applicants made the surprising discovery that a composite structure involving a diffraction grating pattern, a holographic image pattern, or an optical interference pattern placed on the “top” of a light transmissive layer could be observed when the “bottom” of the substrate was provided with an optical coating including an absorber layer on the substrate, an optical dielectric layer on the absorber layer, and a reflector layer on the dielectric layer. This three layer optical coating structure provides a resonant cavity that is reflective in nature, in contrast to Uyama’s partially reflective, mostly transmissive high / low index stack. Also unlike Uyama, who provides a high index layer immediately adjacent the hologram grating, Applicants’ resonant cavity design separates the hologram grating from the reflector layer by the thickness of the light transmissive layer, the absorber layer and the dielectric layer.

The claimed combination of an optical structure such as a hologram with the three layer multilayer optical coating defines a complex optical system. One of ordinary skill could not know whether the hologram would be visible or if it would be lost in the strong performance of the optical coating. At the same time, one of ordinary skill could not predict whether the diffractive effects of the hologram would lead to multi-angle incidence of light entering the optical coating that would interfere with the observance of the normal effects of the three-layer structure when observed independently. Uyama would further teach one of ordinary skill away from separating a reflector layer from the hologram structure.

All of the pending claims now recite the location of the optical structure on the “top” of the light transmissive substrate, and a color shifting optical coating including an absorber layer, a dielectric layer, and a reflector layer at the “bottom” of the substrate. There would be no motivation for one of ordinary skill to modify Uyama to place the hologram pattern on the

top of his layer 4. Nor is there any suggestion that placement of a multilayer color shifting optical coating as defined in these claims on the bottom of Uyama's layer 4 would render the hologram visible, or that the claimed three-layer structure would retain its stand-alone color shifting properties. Applicants discovered that the claimed combination does indeed work. Indeed, the claimed combination was found to produce to unique effects. Hence, Applicants believe claims 9-13, 18-22 and 53-57 set forth patentable subject matter over Uyama and Coombs.

In view of the foregoing, Applicants respectfully request favorable reconsideration and allowance of the present claims. In the event there remains any impediment to allowance of the pending claims which could be clarified in a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney.

Dated this 27th day of May, 2003.

Respectfully submitted,



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